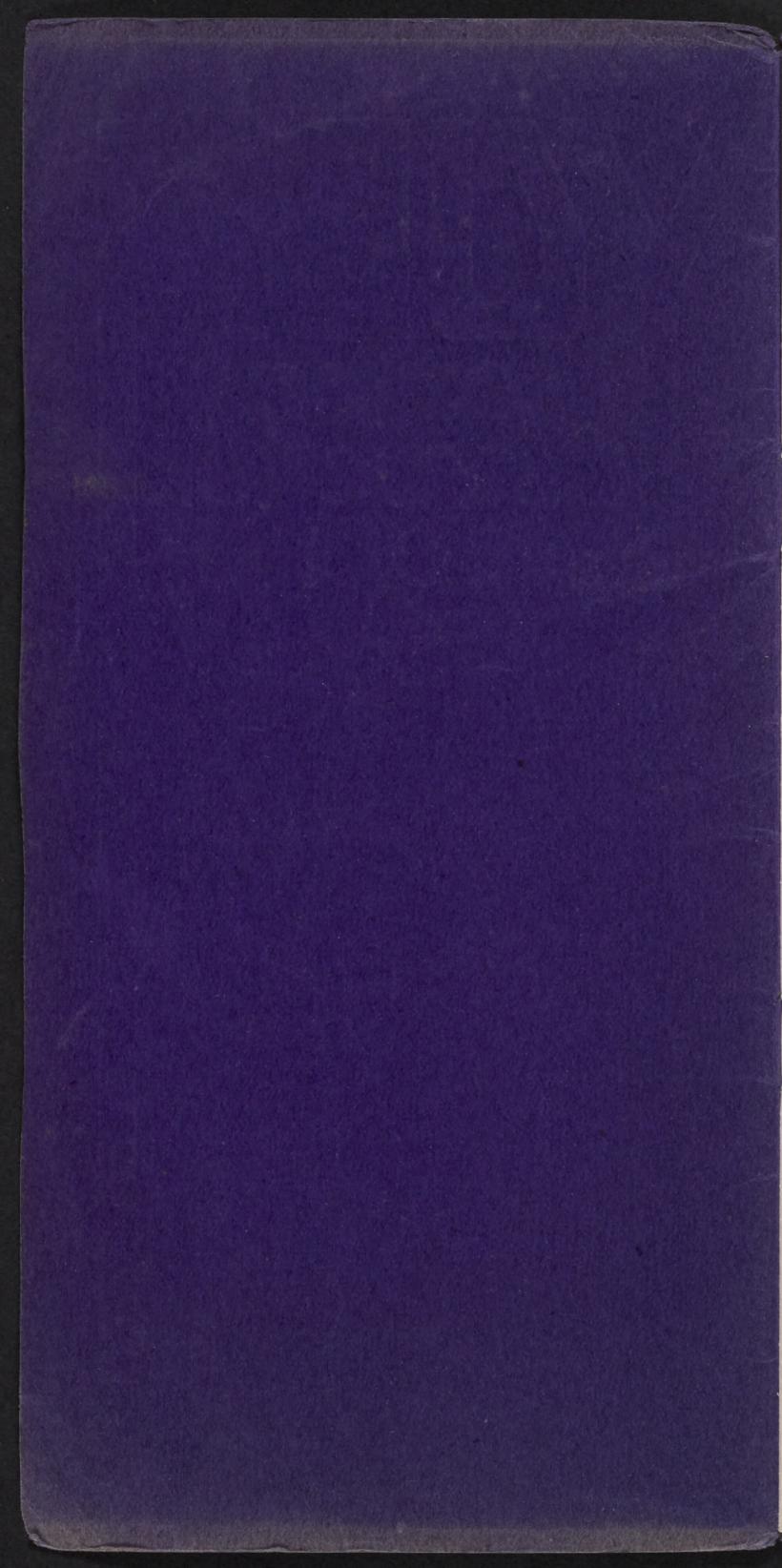
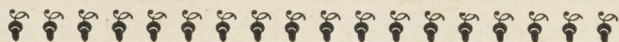


YUBA

20-35

INSTRUCTION
BOOK





Instruction Book for
20-35
**The Yuba Ball Tread
Tractor**



**ITS OPERATION
AND CARE**

No matter how carefully a manufacturer may build a piece of machinery, no matter what precautions he may take to prevent excessive wear and tear upon vital parts, the life of that machine depends absolutely upon the care taken of it by the owner and operator.

The careless, slovenly operator is capable of wrecking the best piece of machinery ever built, in a very short time. Bear these facts in mind while reading this text, now, and as long as you operate a **Yuba Ball Tread Tractor**, or any other machine.

In designing and building **The Yuba Ball Tread Tractor**, the engineers of the **Yuba Manufacturing Company** have exercised every precaution not only in selecting materials and building the machine, but in protecting each part against friction, with its attendant wear and cost.

But these precautions lose their value unless

Instruction Book • Yuba 20-35 Tractor

the operator takes proper care of the tractor while it is in his hands.

The Yuba Ball Tread Tractor is rated to do a certain amount of work at a certain speed. Knowing the amount of work twenty horses can do under certain conditions, give the Model 20-35 tractor the same load. Don't overload it and don't operate it at a higher speed than it is rated for. It will handle a bigger load and go faster than we specify, but continued overloading and continued traveling at an excess speed reduce the life of the tractor and increase the number and cost of repairs. All our ratings are very conservative. A generous margin of safety is allowed. These conservative ratings and the generous margin of safety are the factors responsible for the low cost of upkeep on **The Yuba Ball Tread Tractor**.

The most important subject dealt with in this book is that of lubrication. Friction is the biggest power leak known to machinery. To reduce it to a minimum **The Yuba Ball Tread Tractor** is equipped with high-duty roller bearings and ball bearings, instead of the usual bronze or babbitt bearings. Cut gears of high-grade steel, having a special tooth shape, aid in reducing the loss of power still further. In order to work to maximum advantage, the bearings, gears, motor and track require a sufficient supply of proper lubricant.

After careful study of the matter, we have compiled the accompanying data regarding lubricants. We recommend that our advice be carefully followed in this matter, and that you do not allow yourself to be deluded into thinking that cheaper and lower grade oils and greases will be just as good. They emphatically will not.

Instruction Book, Yuba 20-35 Tractor

It is a very good plan for the operator to cultivate the habit of spending a few minutes each morning in an inspection of the lubrication system, to determine whether all parts have the necessary amount of oil or grease. Such a habit pays well.

Adjustments should be made carefully and as soon as the necessity for them is noticed. Otherwise, they have a habit of developing into expensive repairs.

The Yuba Ball Tread Tractor is so constructed that practically any part can be replaced in the field by the operator, with assurance that the parts will be aligned to 1-1000 of an inch.

It is a good investment to prepare some kind of shelter for protecting the tractor from rust, due to rain and dew. If you have an automobile there is little danger of our being wrong in saying you take great care to keep it protected from the elements, and in a spick-and-span condition. By remembering the tractor is a modified automobile and represents a financial investment of fair size you will see the logic of giving it the same care.

The **Yuba Manufacturing Company** has designed a **Tracover** and will be glad to furnish a folder showing plans and giving bill of material.

GENERAL OPERATION AND CARE OF TRACTOR

STARTING

1. Look tractor over before starting.
2. See that transmission grease is up to proper level.
3. See that all grease cups have been screwed down and refilled.

Instruction Book Yuba 20-35 Tractor

4. See that track oil pots are full and properly feeding.
5. See that fuel tanks are full and fuel is flowing to carburetor properly.
6. See that radiator is full of water.
7. See that there is plenty of oil in motor.
8. Be sure transmission clutches are in neutral.
9. Never spin motor.
10. Motor speed, 700 R.P.M.

In very cold weather it is necessary to prime the motor with gasoline; this is done through the priming cocks on top of cylinders. Also, it is better to run on gasoline until motor warms up, then change over to distillate. When possible to do so always start motor with transmission gears in low gears.

In warm weather it is very easy to get too rich a mixture for starting. Use distillate to start, and don't use too much gasoline to prime with.

SHIFTING SPEED GEARS

The handle, just under the fuel tank, controls the two speeds. In changing speeds always see that the motor is slowed down. To shift into low speed from neutral, shove handle forward as far as it will go. To shift from low to high, pull handle as far back as possible. **Never shift from neutral to high.** Always shift to low first, then pull rod back sharply, care being taken to see that clutch levers are in neutral position. All motions of the speed change lever should be made quickly and firmly.

CONTROL OF CLUTCHES

The two treads are independently controlled by two clutches. When in forward position

Instruction Book, Yuba 20-35 Tractor

the levers drive the treads ahead. Pulling them to the rear reverses the treads.

To make abrupt turns, release one clutch and give the tiller wheel a turn in the proper direction. A little practice will enable the operator to achieve startling results in the way of short turns.

To give the motor the best possible advantage in starting, it is best to gradually throw in the clutches and open the throttle by means of the foot accelerator.

Never allow the motor to run at a high speed except when its ultimate power must be called upon for a few moments. The motor is rated and should be run at below 700 R.P.M.

FUEL

Gasoline, or one of the heavier fuels lying between gasoline and kerosene, referred to in this book as "Distillate," should be used as fuel. If kerosene or an equally heavy fuel is used, special carburetor equipment is necessary.

When the tank is being filled, the distillate should be strained through chamois in order to remove water and other impurities.

The tractor is supplied with a small reservoir for gasoline to be used for starting the engine in cold weather.

LUBRICATION OF TRACTORS

CYLINDERS

Only the best grade of heavy motor cylinder oil should be used. We may mention "Mobile B," "Standard Gas Engine Oil," "Motoreze Extra Heavy," as suitable for summer use. For winter use in cold climate "Valvoline Heavy"

Instruction Book Yuba 20-35 Tractor

cylinder oil, "Mobile A" and "Motoreze Extra" are suggested. We recommend fairly heavy oil.

Be sure that the float on the crank case indicates a high oil level at all times.

TRANSMISSION

The transmission case should be kept filled to the bottom of the shafts with a transmission compound such as Monogram or Union Transmission Grease, or some such mixture as two-thirds Zerolene Triple B to one-third of Zerolene A. Any good grade of transmission grease may be used instead of Zerolene Triple B and any heavy oil of good quality in the place of Zerolene A.

When the machines leave our shops the transmission cases are properly filled with a suitable mixture. The transmission case should be cleaned out and refilled with fresh compound at least once a year.

Whenever the top of the transmission case is off great care should be taken that no dust or dirt finds its way into the parts.

The clutches should be oiled occasionally (at least once every two weeks) with a heavy transmission oil, such as Zerolene A, which should be forced by means of a grease gun into the housing through the forward $\frac{1}{4}$ " brass plug on the outer face of the clutch.

MAGNETO

Magneto should be oiled with a light grade oil (3 in 1), or oil of same grade. Use two drops in each oil hole once a week.

REAR AXLE

Fill grease cups on rear axle with cup grease and be sure to keep axle well greased.

TRACK, BALLS AND SPROCKET

The reservoir of the track should be kept filled with heavy fuel oil or a good heavy lubricating oil, such as "Summer Black" or "Standard Green Skid Oil" for the lubrication of the balls and internal gear. The internal gear should be plentifully supplied. By this the chain and sprocket teeth are lubricated.

Note.—If the best quality of lubricating materials is used, without exception it will be found that the cost of lubrication is greatly reduced. Cheap oils and greases are more expensive in the long run, as the quantity necessary for the proper lubrication of the machine is considerably in excess of that where only the best oils are used.

CARE OF MOTOR

ELIMINATION OF CARBON

At least twice a week steps should be taken to clear the cylinders and rings from carbon.

To do this, feed a pint of kerosene with a priming can in at top of auxiliary air valve, where it will be drawn through the carburetor into motor. This should be done when the motor is warm and running up to usual speed on distillate. Then the motor should be shut off and turned over on quarter, or until all pistons are at approximately even height. Remove the four spark plugs and put about a table spoon of kerosene in each of the cylinders, letting the engine stand in this condition over night.

Before replacing the spark plugs, they should be thoroughly cleaned with gasoline and brush, and inspected, to see that the spark gap is about 1-32 of an inch.

The motor must be thoroughly lubricated,

kept free from dirt, and protected under all conditions, if it is to give the best service.

VALVE GRINDING

After the motor has run a week it is advisable to remove the port plugs and seat the valves in on the carbon. This is done by turning motor over by hand until each valve is successively in its seat. Each valve should then be raised slightly off its seat by a screwdriver under the valve stem, and the seat oiled with cylinder oil. The valve should then be turned slightly back and forth and gradually worked around as in the grinding operation. This is all that is necessary until noticeable leaks should appear (loss of power). In this process use no grinding compound.

As often as the appearance of such leaks may necessitate, the valve springs should be removed, the carbon scraped from the valve chamber and the valves reground. This is done by applying any good valve-grinding compound such as "Clover Brand" to the valve seat. Replace the valve and turn slightly back and forth and gradually work in this way around the circumference of the valve.

Do not revolve the valve continuously in one direction, as this is likely to score slight grooves in the surface of the seats.

From time to time, during the operation, the valves should be raised off their seats and a drop or two of very light lubricant or kerosene applied to the seat. This operation should be continued until both valve and seat show a perfect fit.

Only when valve is very pitted should any but the finest grade of compound be used. When the coarse grade is used always finish carefully with the fine.

Instruction Book Yuba 20-35 Tractor

After very thoroughly cleaning the valve seat and chamber of any compound, apply a small amount of oil and seat the valve in place. This oil glazes the surface and prevents any cutting after motor is put into operation.

VALVE ADJUSTMENTS

After each operation of valve grinding valves should be properly adjusted. This can be done by turning the motor by hand to a point where each valve is successively seated. Then adjust the space between valve tappet and valve stem to 6-1000 inch, about the thickness of an ordinary calling card. A gauge is provided for this purpose. The fly-wheel is marked to show when valves should open and close.

ADJUSTMENT OF MOTOR BEARINGS

Attention should be paid on starting every morning to determine whether there is any knock in motor bearings. Such a knock, when present, can best be detected by putting the transmission gears in neutral position, running slowly, and shorting one spark plug at a time, listening for knock at that cylinder. In case knock is found, the crank case should be removed at once and adjustments made.

At least once each month of continuous operation the crank-case should be removed for general inspection and thoroughly cleaned. Before removing crank case drain off all oil.

To adjust connecting rod bearings, loosen the connecting rod caps and remove one, or more if necessary, of the thin liners which are provided for this purpose, care being taken not to bind the bearings. This can better be done while the bearings are dry or free from oil, BUT, after adjustment is completely made,

Instruction Book, Yuba 20-35 Tractor

remove the cap and thoroughly oil each bearing before final assembly.

After adjusting each bearing it is well to loosen them, until all are adjusted, then tighten all thoroughly. By this means the slightest binding can be detected.

In replacing connecting rod bearing cap, the greatest care must be exercised that the cap is replaced in same position as it was taken off. After the connecting rod bolts are in place they should be wired with soft iron wire to absolutely lock them. The bolts **MUST** be thoroughly tightened.

The crank shaft bearings should be taken up in a similar manner when necessary.

VALVE TIMING

1. Be sure No. 1 intake and exhaust valves have the proper clearance (see Valve Adjustment).
2. Turn motor over in direction it runs, until pointer over fly-wheel is on mark reading Ex-C1-1-4.
3. Turn exhaust cam shaft in the direction it runs, until No. 1 exhaust valve has just closed.
4. Bolt on exhaust cam gear.
5. Turn motor over until fly-wheel pointer is on mark reading In-Op-1-4.
6. Turn intake cam shaft in the direction it runs until No. 1 intake valve just starts to open.
7. Bolt on intake cam gear.
8. Test out work and be sure it is O. K.

The Firing Order on the Wisconsin Motor is 1-3-4-2.

CARE AND ADJUSTMENT OF CARBURETOR

Look for other causes than carburetor adjustment first, if the operation of motor becomes unsatisfactory.

Water in the distillate will cause sputtering and irregular shooting, or loss of power in the motor. The water should be drained off at the cocks on the carburetor. Water can be detected as large globules at the bottom of a vessel of distillate, as it will not mix with the distillate.

Dirt may collect at the screen under the float chamber. The screen should be removed and cleaned. The fuel pipe, from tank to carburetor, may become clogged with foreign matter. This pipe should be disconnected at the unions and blown out clean. Even water may stop the flow of fuel in the fuel pipe. All distillate must be strained through a chamois skin before putting it into the fuel tanks.

CARE OF MAGNETO

The magneto requires very little attention aside from lubrication and keeping the points properly adjusted. A small wrench is provided for setting points with a gauge on the handle of the wrench for determining the distance that the points should be separated at the fullest break. The points should also be kept clean and smooth. Keep brushes clean and oil drain holes opened. (See Bosch catalog.)

NEWTON AUTOMATIC SPARK ADVANCE COUPLING

Should be flushed out with kerosene every week or even daily if conditions are very dusty, to wash out dirt and prevent it sticking.

TO SET MAGNETO

Turn motor over in direction it runs until No. 1 intake valve has just closed. Keep on turning until fly-wheel pointer shows $1\frac{3}{4}$ " before 1-4-D-C mark. Motor is now ready to fire on No. 1 cylinder.

Remove distributor and breaker box cover. Turn magneto over in direction it runs, as indicated by arrow on front oil cup cover, until breaker points just start to open. Bolt magneto to pump shaft flange. Note which terminal the distributor brush is standing on. Use this for No. 1 and wire magneto to spark plugs in firing order of motor. This motor fires 1-3-4-2, replace distributor and breaker box cover.

CARE OF OIL IN MOTOR

Oil should be kept high at all times and should be drained out of oil pan once every week and new oil supplied. Inspect and clean oil screen. By changing oil once a week the oil will be clean and the bearings stand up longer. When drawing off oil remove oil float first and screen last. If oil is drained, by removing screen first, it allows the dirt to get into the oil pumps.

The oil pan should be removed every thirty days and cleaned out with distillate, at which time all bearings should be taken up and all bolts, etc., inspected.

Watch oil tell-tale indicator at all times. If it does not work, find out, and remedy the trouble at once, otherwise you may burn up the motor.

Motor should be examined for knocks every day and repairs made at once when necessary.

FAN BELT

Fan belt should not be tightened until motor has warmed up, otherwise it will be too tight and spring pump-shaft, causing gears to mesh too close and wear out quickly.

Fan belt should be kept soft with **Neatsfoot Oil**.

REMOVING TRUSS RODS

When removing truss rods, under motor, to remove oil pan, care must be taken to see they are tightened up about the same when replaced. If jam nut is backed off one turn and then turn buckle loosened to remove rods, and on putting rods back the turn buckles are tightened to the same place as before in regard to jam nuts, it is possible in this way to keep them the same.

Build and use a tracover.

AIR CLEANER

See that air cleaner is connected with carburetor at all times. It keeps the dirt out and saves cylinder wear. Also, with the low-grade fuel now in general use, it is very necessary to have all the hot air to the carburetor possible.

RADIATOR

Wash dirt out of radiator, inside and outside, whenever necessary. If radiator fills up with dirt it causes motor to run hot. Always use clean, soft water. It lengthens the life of radiator and keeps scale from forming in cylinders. Caution should be used in the use of any compounds for either purifying water or stopping leaks.

ADJUSTING CLUTCHES

Remove cover on transmission case and back out setscrew that holds screw collar and then

Instruction Book, Yuba 20-35 Tractor

turn screw collar to right until set-screw is opposite the next slot in brass check collar. Set up set-screw so that end will come in slot. If clutch still does not hold take up another notch.

TO TIGHTEN REVERSE CLUTCH

Tighten bolt in top end of brake-bands until bands will hold case from turning, when lever is in reverse position.

BALL RACES, TRACKS, ETC.

ALL TYPES OF TREAD

The oiling of the treads is explained under lubrication.

The spring at forward end of track is for the purpose of keeping a certain tension on the track at all times. This spring should be kept fairly tight, that is, it should be compressed by tightening the adjusting nut until the space between coils is about $\frac{1}{8}$ inch, or a little less.

The telescope portion at front end of ball race provides for enough adjustment to allow for the removing of one section of track. This should be done immediately, when there is space of about $4\frac{1}{2}$ inches, at the telescope portion of the race.

The main drive pinions should be kept properly meshed with internal gear. This adjustment is obtained by first loosening the bolt in the axle brackets, and then screwing up the $\frac{5}{8}$ -inch set-screws in bottom of the bracket until pinion is properly meshed. After this adjustment the bracket bolts should be thoroughly tightened. Particular care should be taken that these bolts are kept tight at all times.

There is a special box wrench provided for this purpose.

BOLT TYPE OF TREAD

To remove a tread section, first take out the two $\frac{5}{8}$ -inch bolts holding the shoe to the links from each of the three shoes on top of the front curved portion of the ball race. This is done by turning the bolt heads, as the track is purposely designed to prevent the nuts from turning. Then drive the tractor ahead until the loosened track shoes come to the bottom half of the telescope portion. They can here be removed, one by one, as they reach the ground. Then back the tractor until the uncovered links come to the center on top. This will let out enough balls to make the handling of the track an easy matter.

Next loosen the spring tension adjusting nut to its fullest extent. Then fasten track to the upper front curved front portion of the ball race, by putting a chain clear around both at the point just back of the upright.

Drive ahead slightly while holding the uncovered track link up in the center with a bar. A link can now be easily removed and the track chain re-connected. Now remove the chain holding track to ball race and drive the tractor ahead until the uncovered links come again to the front curved portion on top. Run in balls until the ball race is filled, leaving a space equal to one section. Put the track shoes in place and bolt them securely to the links. Tighten up springs as before and the operation is complete.

When the tractor is first run, the track bolts should be gone over quite often and tightened with a socket wrench, especially provided for this purpose, until they are thoroughly set.

BOLTLESS TYPE TO REMOVE SHOE

To remove a tread section loosen the spring tension adjusting nut to its fullest extent, then fasten track to the upper front curved portion of the ball race by putting chain clear around both at point just back of the upright. Drive ahead slightly to take slack out of track. Then drive out pin. Pins drive out from right to left.

As the pins drive out through hole at top end of front section of ball race it is necessary to chain track so pin will be opposite this hole.

After track is disconnected use a bar and raise loose end track out of ball race. Drive out pin and remove one tread. It is then necessary to work balls out from under treads before lifting out of ball race.

TO COUPLE TRACK TOGETHER

Have front of track chained to ball race, opposite hole in ball race. Then drive slowly ahead until track comes together. Drive in pin, driving it from left to right. Remove chain around track and race.

TO REMOVE BALLS FROM RACE

Disconnect track and remove treads. (See above paragraph.)

In place of the tread removed, place in false link (this comes with tool equipment of tractor), and connect up track.

Run tractor ahead until false link comes on bottom. Then back and forth until balls are out. It is often better to block tractor up so tracks are clear off ground.

TO REPLACE BALLS IN RACE

This can be done by placing wooden block between top of spring yoke and ball race, jack-

Instruction Book, Yuba 20-35 Tractor

ing up tractor on same side until track is off the ground.

Tighten up spring tension adjusting nut until track is close enough to bottom of ball race so balls won't drop out. Then run track back and forth on top of ball race, dropping balls into race through track at false link. As the balls tighten up track, slacken up on spring tension adjusting nut.

When all the balls are in connect up track. Where a jack is not used, the same results can be attained by moving the tractor back and forth on the ground.

TO REMOVE BALL RACES

(Complete with Balls and Track, Bolt Type)

Jack up tractor, placing jack under back end of tractor. Remove two shoes and move track so this space is over end of track supporting spring yoke shaft. Remove this shaft, remove axle nuts and slide ball race off of axle.

TO REMOVE BALL RACE COMPLETE

(Boltless Type)

Jack up tractor as above. Remove bolts holding the track support spring yoke to frame. Remove axle nuts and slide ball race off axle.

TO REPLACE

Reverse the process.

It is much easier to put on races by using a pilot pin. This screws on end of axle, the long threaded end extending through ball race, and by screwing up the nut you can pull races on to axle.

TO USE TRACTOR AS STATIONARY PLANT

When the tractor is to be taken off the draw bar work and to be used for stationary work, the mitre gear case with its gears and bushings should be carefully inspected and the gear case filled with good grease.

Remove the small protector on the end of the shaft by backing off the one-inch Hex nut on end of pulley shaft. Fit the pulley for driving the pump, thresher, or whatever machinery is to be used, to the shaft, using the key and nut belonging with the tractor.

FRAME BOLTS, ETC.

All bolts should be gone over and tightened up every few days, especially while tractor is new.

Keep tractor clean. Removing dirt and mud from tracks; leaves, chaff or straw from radiator; grease and dirt from motor.

Do not overload tractor. Remember that a traction engine, though it has a certain reserve power, cannot develop the overload for short periods that it is possible for a horse to do.

Do not allow any bearings to get dry.

Use clean water, good oils, and good fuel.

Operate and care for your tractor as carefully as you do your high-class automobile. Suggestion: Build a Tracover. (Blueprints and plans sent on request.)

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Date.....

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